

MATERIAL NUMBER 1.4541 · CLASS 1.4

# 12TiNiCr180

Material no. 1.4541

also listed as X6CrNiTi18-10

Chemical composition, mechanical and physical property values, and 175 standard designations from 24 regions.

|                             |                                                |                                     |
|-----------------------------|------------------------------------------------|-------------------------------------|
| DENSITY<br><b>7.9</b> g/cm³ | OTHER DESIGNATIONS<br><b>175</b> in 24 regions | PROPERTY VALUES<br><b>9</b> on file |
|-----------------------------|------------------------------------------------|-------------------------------------|

## Chemical composition

Mass fraction in %

What this alloy is



Logarithmic scale, 0.01 % to 100 % — every value here compares directly, decade by decade.



The scale is logarithmic, not the element's raw share of the alloy — the only honest way to fit 0.01 % and 100 % in one picture, and it means every value here can be compared with every other.

## Predicted transformation temperatures

Not enough recorded composition to predict a transformation temperature for this grade — missing: Mo.

## Mechanical properties

23 values across 7 conditions

| CONDITION · DIMENSION                             | RM<br>N/mm <sup>2</sup> | A5<br>% | HB  |
|---------------------------------------------------|-------------------------|---------|-----|
| Bar cold-worked , GOST 18907-73                   | 880–930                 | –       | –   |
| Wire, GOST 18143-72                               | 590–880                 | 20–25   | –   |
| 12KH18N9T ( 12X18H9T ) , Forging<br>GOST 25054-81 | –                       | –       | 170 |

| CONDITION · DIMENSION  | RM<br>N/mm <sup>2</sup> | RE<br>N/mm <sup>2</sup> | A<br>% | HB  | HRB | HV  |
|------------------------|-------------------------|-------------------------|--------|-----|-----|-----|
| Plate/Sheet Hot-rolled | 520                     | 205                     | 40     | –   | –   | –   |
| Hot-rolled             | –                       | –                       | –      | 187 | 90  | 200 |

| SOFT ANNEALED | HB  |
|---------------|-----|
| Soft annealed | 215 |

| SOLUTION ANNEALED | HB  |
|-------------------|-----|
| Solution annealed | 210 |

| QUENCHING 1020 - 1100°C, COOLING<br>AIR | RM<br>N/mm <sup>2</sup> | RE<br>N/mm <sup>2</sup> | A5<br>% | Z<br>% |
|-----------------------------------------|-------------------------|-------------------------|---------|--------|
| to Ø 60                                 | 540                     | 196                     | 40      | 55     |

| QUENCHING 1050 - 1100°C | RM<br>N/mm <sup>2</sup> | RE<br>N/mm <sup>2</sup> | A5<br>% | Z<br>% |
|-------------------------|-------------------------|-------------------------|---------|--------|
| to 1000                 | 510                     | 196                     | 35–40   | 40–48  |

| CONDITION · DIMENSION     | RM<br>N/mm <sup>2</sup> | RE<br>N/mm <sup>2</sup> | A5<br>% |
|---------------------------|-------------------------|-------------------------|---------|
| Sheet trick, GOST 7350-77 | 530                     | 215                     | 38      |

## Physical properties

2 values

| CONDITION · DIMENSION | RHO<br>g/cm <sup>3</sup> | E<br>GPa | ALPHA<br>10 <sup>^-6</sup> /K | LAMBDA<br>W/(m·K) | CP<br>J/(kg·K) | RHO_EL<br>nΩ·m |
|-----------------------|--------------------------|----------|-------------------------------|-------------------|----------------|----------------|
| 20                    | 7.9                      | 195      | –                             | –                 | –              | 725            |
| 100                   | 7.86                     | 189      | 16.6                          | 16                | 469            | 792            |
| 200                   | 7.82                     | 182      | 17                            | 18                | 486            | 861            |
| 300                   | 7.78                     | 175      | 17.6                          | 20                | 498            | 920            |
| 400                   | 7.74                     | 167      | 18                            | 21                | 511            | 976            |
| 500                   | 7.69                     | –        | 18.3                          | 23                | 519            | 1028           |
| 600                   | 7.65                     | 153      | 18.6                          | 25                | 528            | 1075           |

| CONDITION · DIMENSION | RHO<br>g/cm³ | E<br>GPa | ALPHA<br>10 <sup>-6</sup> /K | LAMBDA<br>W/(m·K) | CP<br>J/(kg·K) | RHO_EL<br>nΩ·m |
|-----------------------|--------------|----------|------------------------------|-------------------|----------------|----------------|
| 700                   | 7.6          | 143      | 18.9                         | 26                | 532            | 1117           |
| 800                   | 7.56         | 135      | 19.3                         | 28                | 544            | 1149           |
| 900                   | 7.51         | –        | 19.5                         | 29                | 548            | 1176           |
| 1000                  | –            | –        | 20.1                         | –                 | –              | –              |

| PROPERTY | VALUE | UNIT  |
|----------|-------|-------|
| Density  | 7.9   | g/cm³ |

Technological properties

| PROPERTY    | VALUE                | UNIT |
|-------------|----------------------|------|
| Weldability | without limitations. |      |

## Designations across standards

175 designations · 3 documented as identical

|                    |                       |          |                |      |
|--------------------|-----------------------|----------|----------------|------|
| United States      |                       | 53       | A988           | astm |
| S32100             | This grade's own name | uns      | F2281          | astm |
| S32109             |                       | uns      | F593           | astm |
| 0890A              |                       | aisi-sae | F594           | astm |
| 30321              |                       | aisi-sae | F738           | astm |
| 321                | This grade's own name | aisi-sae | F836           | astm |
| 321H               |                       | aisi-sae |                |      |
| S32100             |                       | aisi-sae | United Kingdom | 25   |
| S32109             |                       | aisi-sae | 1010           | bs   |
| A 182 Grade F321   |                       | astm     | 1105           | bs   |
| A 312 Grade TP321  |                       | astm     | 2S129          | bs   |
| A 403 Grade WP321  |                       | astm     | 321 S 50       | bs   |
| A1012              |                       | astm     | 321 S 51-490   | bs   |
| A1049              |                       | astm     | 321 S 51-510   | bs   |
| A167               |                       | astm     | 321S12         | bs   |
| A182               |                       | astm     | 321S18         | bs   |
| A193               |                       | astm     | 321S20         | bs   |
| A193 Grade B8T CL1 |                       | astm     | 321S22         | bs   |
| A194               |                       | astm     | 321S31         | bs   |
| A213               |                       | astm     | 321S51         | bs   |
| A240               |                       | astm     | 321S59         | bs   |
| A249               |                       | astm     | 58B            | bs   |
| A264               |                       | astm     | EN58B          | bs   |
| A269               |                       | astm     | LW18           | bs   |
| A276               |                       | astm     | LW24           | bs   |
| A312               |                       | astm     | LWCF 18        | bs   |
| A313               |                       | astm     | LWCF 24        | bs   |
| A314               |                       | astm     | S129           | bs   |
| A320               |                       | astm     | S31 EN 58B     | bs   |
| A320 Grade B8T     |                       | astm     | S524           | bs   |
| A336               |                       | astm     | S526           | bs   |
| A358               |                       | astm     | T67            | bs   |
| A376               |                       | astm     | X6CrNiTi18-10  | bs   |
| A409               |                       | astm     |                |      |
| A430               |                       | astm     |                |      |
| A473               |                       | astm     |                |      |
| A479               |                       | astm     |                |      |
| A484               |                       | astm     |                |      |
| A511               |                       | astm     |                |      |
| A554               |                       | astm     |                |      |
| A580               |                       | astm     |                |      |
| A632               |                       | astm     |                |      |
| A774               |                       | astm     |                |      |
| A778               |                       | astm     |                |      |
| A813               |                       | astm     |                |      |
| A814               |                       | astm     |                |      |
| A943               |                       | astm     |                |      |
| A965               |                       | astm     |                |      |

| Russia / CIS              |      | 22 | China                         |  | 8     |
|---------------------------|------|----|-------------------------------|--|-------|
| 06Ch18N10T                | gost |    | 0Cr18Ni10Ti                   |  | gb    |
| 06X18H10T                 | gost |    | 0Cr18Ni11Ti                   |  | gb    |
| 08Ch18N10T                | gost |    | 0Cr18Ni9Ti                    |  | gb    |
| 08KH18N10T                | gost |    | 1Cr18Ni11Ti                   |  | gb    |
| 08KH18N12T                | gost |    | 1Cr18Ni9T                     |  | gb    |
| 08X18H10T                 | gost |    | 1Cr18Ni9Ti                    |  | gb    |
| 08X18H10T                 | gost |    | H0Cr20Ni10Ti                  |  | gb    |
| 08X18H12T                 | gost |    | OCr18Ni10Ti                   |  | gb    |
| 09Ch18N10T                | gost |    |                               |  |       |
| 0X18H10T                  | gost |    | France                        |  | 7     |
| 0X18H12T                  | gost |    | 321F00                        |  | afnor |
| 10Ch18N10T                | gost |    | Z10CNT18-10                   |  | afnor |
| 10X18H10T                 | gost |    | Z10CNT18-11                   |  | afnor |
| 12Ch18N10T                | gost |    | Z6CN18-10                     |  | afnor |
| 12KH18N10T                | gost |    | Z6CNT18-10                    |  | afnor |
| 12KH18N9T                 | gost |    | Z6CNT18-12                    |  | afnor |
| 12X18H10T                 | gost |    | Z6CNT18.11                    |  | afnor |
| 12X18H9T                  | gost |    |                               |  |       |
| Ch18N10T                  | gost |    | Poland                        |  | 6     |
| X18H10T                   | gost |    | 0H18N10T                      |  | pn    |
| X18H9T                    | gost |    | 0H18N10T 1H18N9T 1H18N10T     |  | pn    |
| ЭИ914                     | gost |    | 1H18N10T                      |  | pn    |
|                           |      |    | 1H18N12T                      |  | pn    |
|                           |      |    | 1H18N9T                       |  | pn    |
|                           |      |    | 1H18N9T lub 0H18N10T 1H18N10T |  | pn    |
| United States / Aerospace |      | 8  | Spain                         |  | 5     |
| 5510                      | ams  |    | F.332                         |  | une   |
| 5557                      | ams  |    | F.3523                        |  | une   |
| 5559                      | ams  |    | F.3553                        |  | une   |
| 5570                      | ams  |    | F.3553-X 7 CrNiTi 18-11       |  | une   |
| 5576                      | ams  |    | X6CrNiTi18-10                 |  | une   |
| 5645                      | ams  |    |                               |  |       |
| 5689                      | ams  |    |                               |  |       |
| 7490                      | ams  |    |                               |  |       |
| Japan                     |      | 8  | Italy                         |  | 4     |
| SUS 321FB                 | jis  |    | X6CrNiTi18-11KG               |  | uni   |
| SUS 321TB                 | jis  |    | X6CrNiTi18-11KT               |  | uni   |
| SUS 321TKA                | jis  |    | X6CrNiTi1811                  |  | uni   |
| SUS 321TP                 | jis  |    | X8CrNiTi1811                  |  | uni   |
| SUS F 321                 | jis  |    |                               |  |       |
| SUS Y 321                 | jis  |    | Hungary                       |  | 4     |
| SUS321                    | jis  |    | H5Ti                          |  | msz   |
| SUS321TK                  | jis  |    | KO36Ti                        |  | msz   |
|                           |      |    | KO37Ti                        |  | msz   |
|                           |      |    | X6CrNiTi18-10                 |  | msz   |

|                    |        |                                |        |
|--------------------|--------|--------------------------------|--------|
| <b>Bulgaria</b>    | 4      | <b>Romania</b>                 | 2      |
| OCh18N10T          | bds    | 10TiNiCr180                    | stas   |
| Ch18N12T           | bds    | 12TiNiCr180                    | stas   |
| Ch18N9T            | bds    |                                |        |
| X6CrNiTi18-10      | bds    | <b>Austria</b>                 | 2      |
| <b>Europe</b>      | 3      | X6CrNiTi18-10KKW               | onorm  |
| 1.4541             | din-en | X6CrNiTi18-10S                 | onorm  |
| X10CrNiTi18-9      | din-en | <b>Sweden</b>                  | 1      |
| X6CrNiTi18-10      | din-en | 2337                           | ss     |
| <b>Czechia</b>     | 3      | <b>Brazil</b>                  | 1      |
| 17246              | csn    | 321                            | abnt   |
| 17247              | csn    |                                |        |
| 17248              | csn    | <b>Serbia</b>                  | 1      |
| <b>South Korea</b> | 3      | Č.4572                         | srps   |
| STS321             | ks     | <b>former Yugoslavia</b>       | 1      |
| STS321TKA          | ks     | Č.4572                         | jus    |
| STSF321            | ks     | <b>Australia / New Zealand</b> | 1      |
| <b>Slovakia</b>    | 2      | 321                            | as-nzs |
| 17 246             | stn    | <b>Finland</b>                 | 1      |
| 17 247             | stn    | 731                            | sfs    |

**Note on use.** The data is compiled to the best of our knowledge from publicly available standards and manufacturer documentation. It replaces neither material testing nor an inspection document to EN 10204. Please request a mill certificate to EN 10204 2.1, 3.1 or 3.2 together with your enquiry. The standard in its current valid edition always prevails.

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#### MATERIAL NO.

1.4541

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